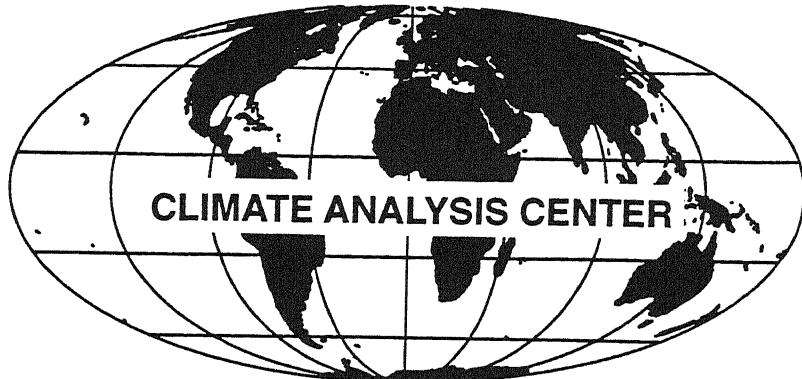


CONTAINS:

1993 ANNUAL
UNITED
STATES
CLIMATE
SUMMARY



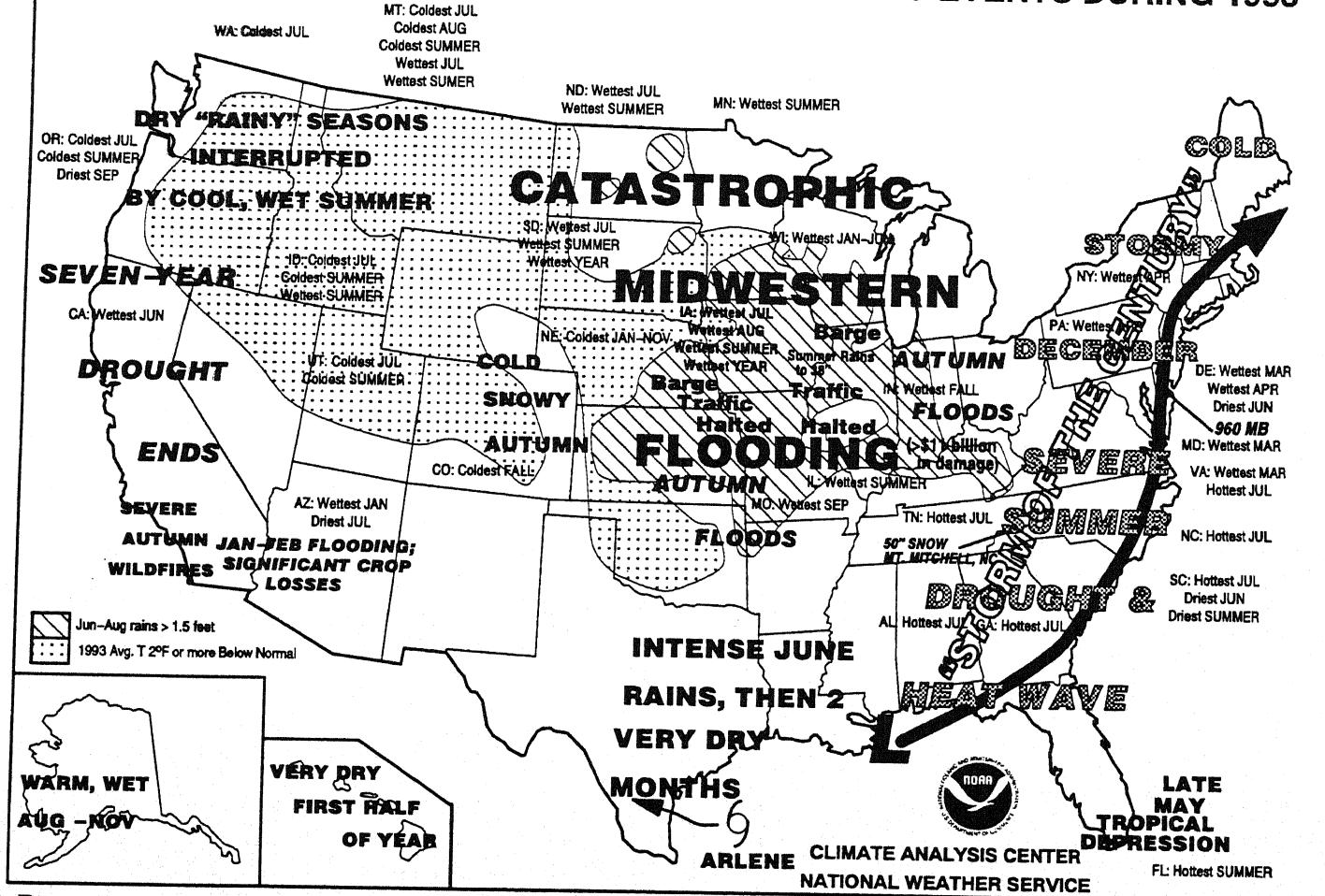
WEEKLY CLIMATE BULLETIN

No. 94/04

Washington, DC

January 26, 1994

SIGNIFICANT CLIMATE ANOMALIES AND EPISODIC EVENTS DURING 1993



For more specific information on climate anomalies and episodic events observed across the United States during 1993, refer to the Annual Climate Summary on pp. 7 - 14.



UNITED STATES DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE-NATIONAL METEOROLOGICAL CENTER
CLIMATE ANALYSIS CENTER



WEEKLY CLIMATE BULLETIN

This Bulletin is issued weekly by the Climate Analysis Center and is designed to indicate, in a brief concise format, current surface climatic conditions in the United States and around the world. The Bulletin contains:

- Highlights of major climatic events and anomalies.
- U.S. climatic conditions for the previous week.
- U.S. apparent temperatures (summer) or wind chill (winter).
- Global two-week temperature anomalies.
- Global four-week precipitation anomalies.
- Global monthly temperature and precipitation anomalies.
- Global three-month precipitation anomalies (once a month).
- Global three-month temperature anomalies (once a month).
- Global twelve-month precipitation anomalies (every three months).
- Global twelve-month temperature anomalies (every three months).
- Special climate summaries, explanations, etc. (as appropriate).

Most analyses contained in this Bulletin are based on preliminary, unchecked data received at the Climate Analysis Center via the Global Telecommunications System. Similar analyses based on final, checked data are likely to differ to some extent from those presented here.

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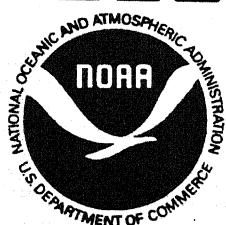
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GLOBAL CLIMATE HIGHLIGHTS

MAJOR CLIMATIC EVENTS AND ANOMALIES AS OF JANUARY 22, 1994

1. East-Central North America:

FRIGID CONDITIONS PERSIST.

Temperatures averaged as much as 14°C below normal in Ohio as Arctic air continued to cover the region. Lows approached -43°C at some locations while the mercury plunged to -30°C as far south as Ohio. In addition, gusty winds combined with the low temperatures to yield wind chills below -40°C across much of the region, with values plummeting to -60°C in parts of Illinois, Iowa, and Minnesota. The intense cold engendered energy shortages which forced the Federal Government, many state governments, and numerous businesses to close. In addition, several locations across the Ohio Valley and central Appalachians established new all-time record low temperatures. Fortunately, temperatures began slowly moderating at the end of the week (see page 4) [COLD - 5 weeks].

2. East-Central South America:

SHORT-TERM MOISTURE DEFICITS GROW AS UNUSUALLY WET WEATHER EASES.

Although as much as 90 mm of rain fell on isolated parts of Argentina, most of the region received less than 30 mm. During the past four weeks, rainfall shortages have been slowly increasing across the area [DRY - 4 weeks].

3. Western Europe:

SOMEWHAT DRIER CONDITIONS PREVAIL.

Between 30 mm and 50 mm of precipitation fell across northern Spain, southwestern France, and Denmark while under 20 mm was reported elsewhere. Despite the relatively dry week, six-week moisture surpluses remained as high as 160 mm in the United Kingdom and approached 250 mm in Spain [WET - 8 weeks].

4. The Middle East and Southeastern Europe:

STILL UNUSUALLY MILD.

Temperatures averaged as much as 7°C above normal as unseasonably mild conditions persisted [WARM - 7 weeks].

5. Southeastern South Africa:

ABNORMALLY WET CONDITIONS DEVELOP.

Heavy rainfall, with weekly totals of 40 mm to 100 mm at some locations has drenched the region for seven of the past eight weeks, engendering sizable moisture surpluses [WET - 8 weeks].

6. Indonesia and the Philippines:

HEAVY PRECIPITATION RETURNS.

Frequent thunderstorm activity yielded as much as 180 mm of rain as abnormally wet weather returned. Since early December, moisture surpluses of up to 140 mm accumulated in Indonesia while excesses climbed as high as 540 mm on parts of southern Luzon. According to press reports, the heavy rains caused the worst flooding in a decade on Java [WET - 8 weeks].

7. Northeastern Australia:

STILL VERY WARM AND DRY.

Isolated showers dropped 50 mm of rain at some coastal locations, but less than 20 mm fell on most of the region. Six-week moisture deficits climbed above 100 mm across much of the region, with excesses reaching 290 mm at Cairns [DRY - 6 weeks]. Temperatures averaged up to 6°C above normal, aggravating the dry conditions as highs soared above 40°C [WARM - 4 weeks].

8. South-Central Australia:

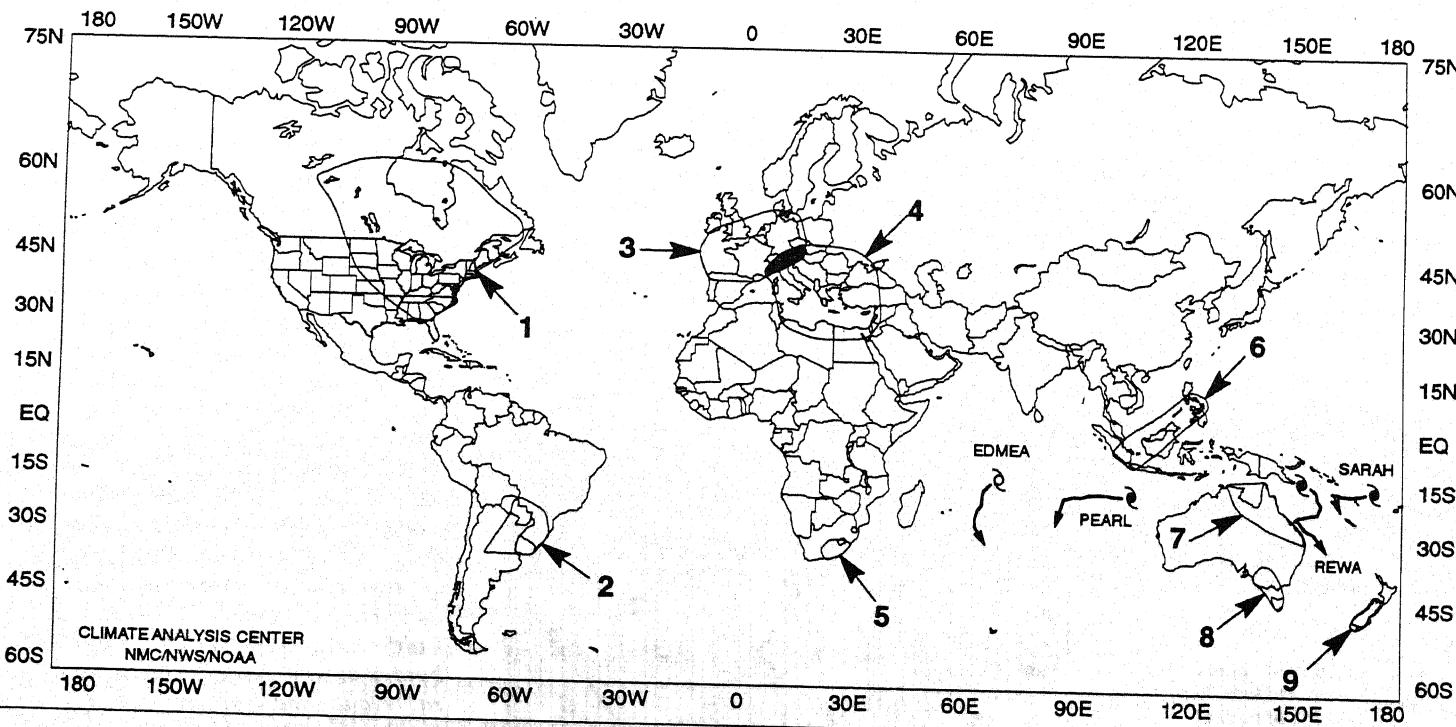
COOL AND DRY WEATHER PREVAILS.

Less than 20 mm of rain fell last week as the wet spell ended [WET - Ended at 8 weeks]. Unusually cool conditions, however, persisted as weekly departures dipped to -4°C at some locations [COOL - 5 weeks].

9. Southern New Zealand:

HEAVY PRECIPITATION CONTINUES.

Last week, 30 mm to 60 mm of rain exacerbated the abnormally wet condition on South Island [WET - 5 weeks].



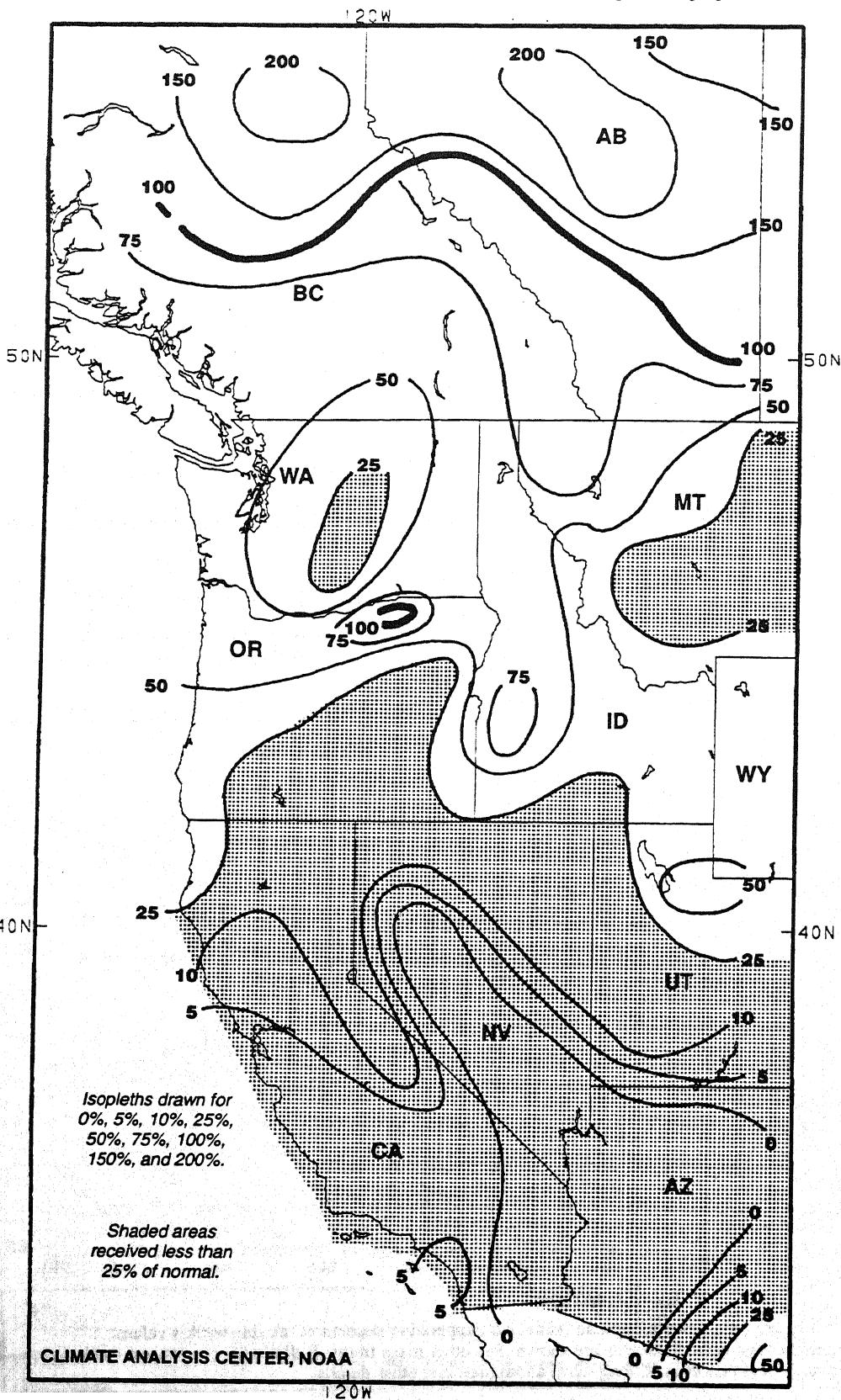
EXPLANATION

TEXT: Approximate duration of anomalies is in brackets. Precipitation amounts and temperature departures are this week's values.
MAP: Approximate locations of major anomalies and episodic events are shown. See other maps in this Bulletin for current two week temperature anomalies, four week precipitation anomalies, long-term anomalies, and other details.

GLOBAL CLIMATE HIGHLIGHTS FEATURE

PERCENT OF NORMAL PRECIPITATION

December 19, 1993 – January 21, 1994 [34 days]



A WARM AND DRY REGIME DOMINATES THE FAR WEST SINCE MID-DECEMBER. While brutally cold air and winter storms have dominated the nation's weather east of the Rockies, balmy and tranquil conditions have covered the country west of the Continental Divide, especially across Utah, the Great Basin, Arizona, and California. Temperatures consistently averaged 4°F to 10°F above normal since the beginning of January, with numerous new daily maximum temperature records established along the western tier of states. Last week, highs reached into the seventies as far north as northern California, with eighties reported from Los Angeles southwestward across southern sections of California and Arizona. In addition, little or no precipitation fell across most of the central and southern Great Basin, California, Arizona, the southern half of Utah, central Montana, and central Washington since December 19, with the primary storm track diverted northward across central British Columbia by a strong, persistent upper-level ridge. Only one location west of 109°W and south of 51°N recorded surplus moisture during the period. The mild, dry conditions have proven beneficial for the Los Angeles, CA area as the region continues clean-up operations in the aftermath of the recent powerful earthquake, but continued subnormal precipitation will adversely affect streamflows and water supplies across the western U.S., which receives most of its annual rainfall during October – March. During January 21 – 23, a series of frontal systems tracked into the western U.S. as the upper-level ridge at least temporarily broke down. Between one and four inches of precipitation dampened most locations from west-central California northward to the Oregon border, as well as the northern Sierra Nevada and southern Cascades. Totals of up to three inches were scattered along the western tiers of Oregon and Washington; however, little or no precipitation was observed elsewhere.

UNITED STATES WEEKLY CLIMATE HIGHLIGHTS

FOR THE WEEK OF JANUARY 16 - 22, 1994

Bitterly cold Arctic air plunged southward into the eastern two-thirds of the nation behind a powerful cold front, bringing all-time record cold to over a dozen cities in the upper Ohio Valley, the lower Great Lakes, and the central Appalachians on Wednesday morning and to parts of eastern Pennsylvania on Friday morning. At least 26 daily record lows were set on Tuesday, 67 on Wednesday, 16 on Thursday, and another half dozen on Friday from the northeastern Plains eastward to the northern and middle Atlantic Coast. The largest departures from normal covered the Ohio Valley, where temperatures averaged up to 24°F below normal for the week. High wind accompanying the cold front generated dangerous wind chills ranging from -45°F to -83°F from the northern High Plains eastward through the Ohio Valley and Northeast. The record cold, occasionally accompanied by wintry precipitation, crippled much of the Midwest, mid-Atlantic, Northeast, and Southeast, bursting water pipes, snarling traffic, canceling flights at many airports, closing schools and businesses, triggering power outages, and promoting the declaration of a state of emergency in New Jersey, Pennsylvania, and Washington, D.C. Moist southerly flow ahead of the front on Monday brought up to two feet of snow to parts of the Ohio Valley and the central and northern Appalachians while ice coated parts of the mid-Atlantic and Northeast, causing numerous accidents. According to press reports, the cold wave was blamed for at least 130 deaths. Many died in icy road crashes, some suffered heart attacks while shoveling snow, and others succumbed to exposure. In sharp contrast, unseasonably mild weather prevailed across the western third of the country, where over three dozen daily record highs were broken from Tuesday to Saturday.

At the start of the week, cold Arctic air remained across the eastern third of the nation in the wake of the previous week's cold front as yet another powerful frontal system pushed through the northern Plains and moved southeastward. Ahead of the system, rain fell over the southeastern Plains and lower Mississippi Valley, a mixture of snow, sleet, and freezing rain spread over the middle Mississippi and Ohio Valleys, and heavy snow blanketed the upper Mississippi Valley and Great Lakes. By Tuesday, the system pushed eastward into the Atlantic Ocean after soaking the lower Mississippi Valley and portions of the Southeast with heavy rain, dumping heavy snow on the Ohio Valley and Appalachians, and spreading snow, sleet, and freezing rain over the mid-Atlantic and Northeast. In sharp contrast, mild and dry weather continued to prevail over the western third of the nation.

At mid-week, the bitterly cold air settled over the East while warm conditions continued in the West, with temperatures

reaching into the sixties in the Great Basin and into the eighties across southern California and southern Arizona. High pressure and dry conditions dominated much of the nation, with precipitation limited to scattered snow from Wyoming to the lower Great Lakes and upper Ohio Valley. During the latter part of the week, a gradual warming occurred as the large Arctic high pressure system over the eastern half of the United States drifted southeastward. Another cold front, however, dipped southward out of Canada and extended from southern New England westward into the northern High Plains at week's end. Elsewhere, an upper-level weather disturbance brought steady rain to Texas while a Pacific Ocean front spread rain over the northern and central Pacific seaboard. Farther north, a weak impulse dropped between two and five inches of snow in a band from the Corn Belt eastward across the mid-Atlantic on Wednesday and Thursday as the Arctic air began its retreat.

According to the River Forecast Centers, the greatest weekly precipitation totals (two to four inches) fell on portions of the lower Rio Grande and lower Mississippi Valleys, the mid-Atlantic, and the Northeast. Scattered totals exceeding two inches were also reported in the Cascades of Washington, along the northern California and southern Alaskan Coast, and across the southeastern Plains, the Southeast, the Ohio Valley, the Appalachians, and the Island of Hawaii. Light to moderate amounts were measured in the northern and central Rockies and much of the remainders of the Pacific Northwest, northern California, the Great Plains, Alaska, Hawaii, and the eastern half of the nation. Little or no precipitation occurred across southern California, the Great Basin, the desert Southwest, the southern Rockies, the central High Plains, and far northern and portions of southwestern Alaska.

Unseasonably mild weather prevailed in the Far West, the Intermountain West, the Rockies, southern Texas, and southern Florida, with weekly departures from +6°F to +16°F observed over the interior Pacific Coast States, the Intermountain West, and the northwestern and central Rockies. Abnormally warm conditions also prevailed in Alaska, with weekly departures up to +18°F recorded at Ft. Yukon.

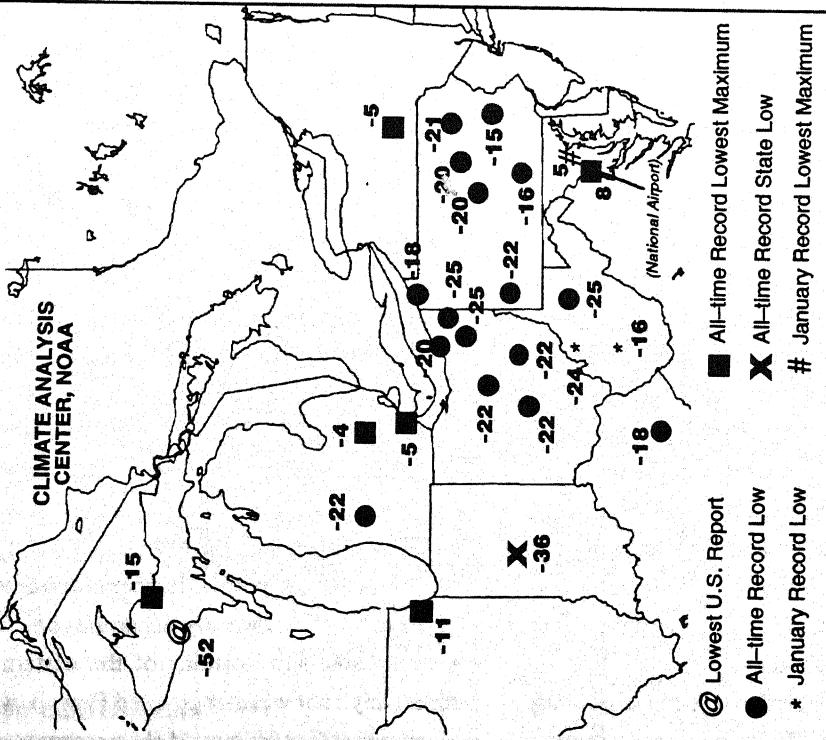
Much below normal temperatures dominated the remainder of the nation, with weekly departures below -8°F over all but the extreme southern portions of the eastern half of the country. Relatively cool weather covered Hawaii, with weekly departures reaching -3°F at Hilo and Lihue.

ALL-TIME HIGHLIGHTS CLIMATE

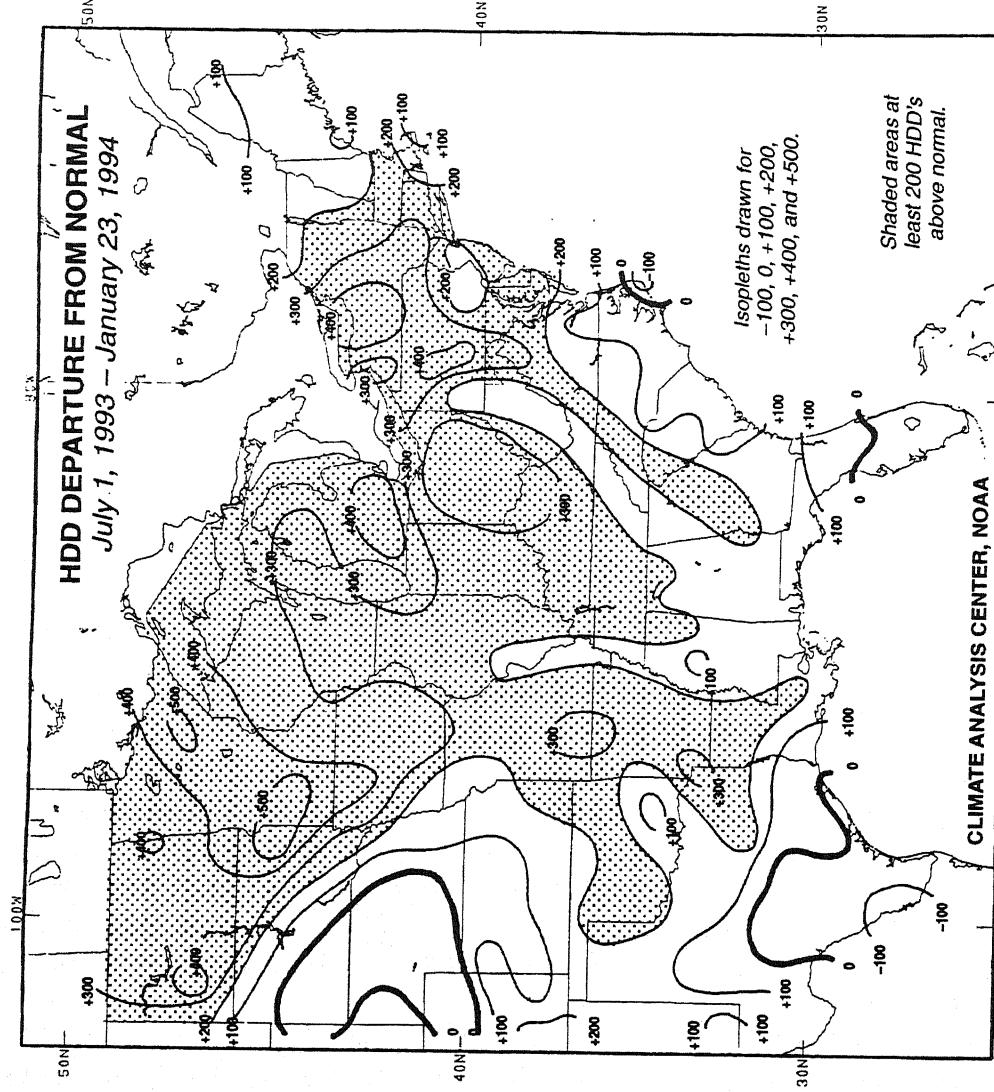
ALL-TIME AND JANUARY RECORDS ESTABLISHED DURING RECENT COLD SNAP

January 18 – 21, 1994

All temperatures in degrees Fahrenheit.

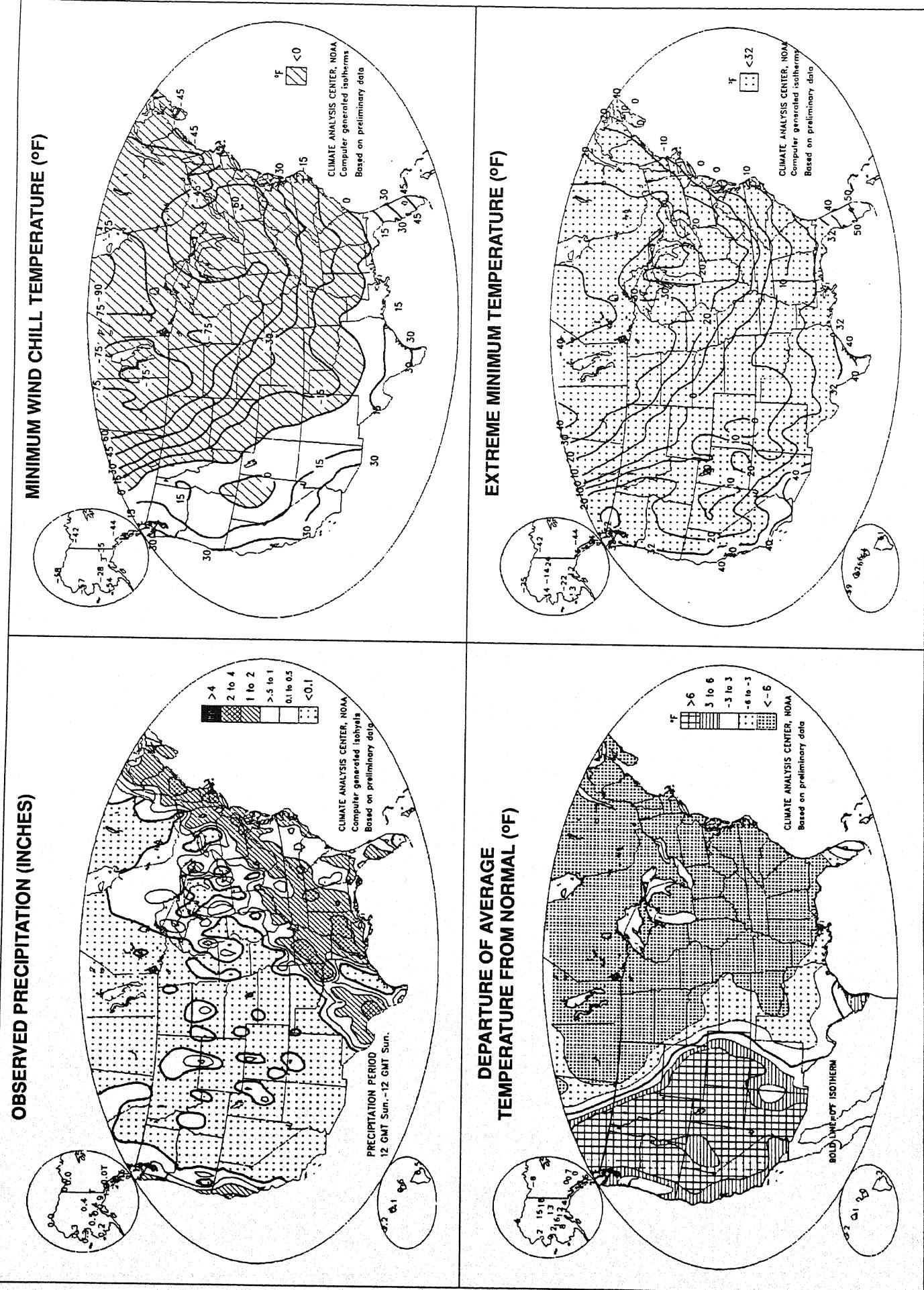


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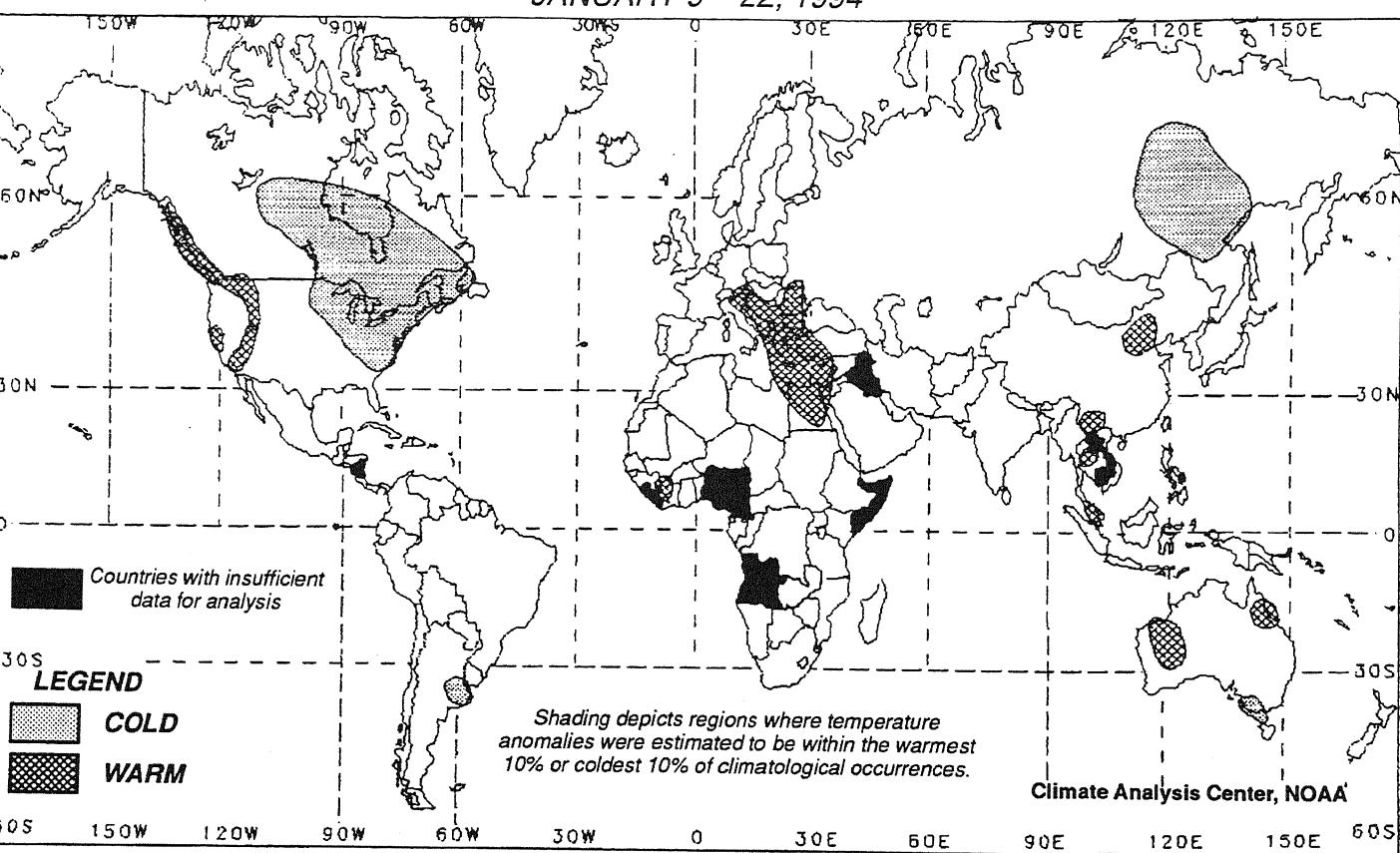
BRUTAL COLD SNAP ESTABLISHES OVER A HUNDRED DAILY RECORD LOWS AND STRESSES POWER SUPPLIERS ACROSS THE UPPER OHIO VALLEY, CENTRAL AND NORTHERN APPALACHIANS, AND NORTHEAST. Over a dozen all-time record lows were established from eastern Ohio and Kentucky northward across West Virginia and Pennsylvania as bitterly cold Arctic air swept across the eastern half of the nation. Wind chills below -25°F were reported as far south as Atlanta, GA, and subzero readings covered all but southeasternmost Virginia, northern and western North Carolina, and northern and eastern Tennessee. Both Hibbing and St. Cloud, MN dropped to -40°F as the core of the coldest air traversed the northern tier of states, with unofficial reports indicating that thermometers in Ames, IA may have plunged to -52°F (top left). The recent cold snap helped push seasonal heating degree day totals above normal across the entire U.S. east of the Rockies, except for parts of central and southern Texas, the Florida Peninsula, and the northwestern Great Plains. The largest HDD surpluses accumulated from the upper Mississippi Valley southeastward across the northern and eastern Great Lakes, Ohio Valley, northern mid-Atlantic, and lower Northeast, where seasonal totals of 2700–6100 HDD's were 300–700 above normal (top right). Much of this seasonal surplus accumulated during the Arctic outbreaks of the last two weeks, and the resultant excessive power demand forced suppliers to impose voltage reductions (brownouts) and controlled, localized outages (rolling blackouts) in an effort to prevent widespread, prolonged losses of power.

UNITED STATES WEEKLY CLIMATE CONDITIONS (January 16 – 22, 1994)



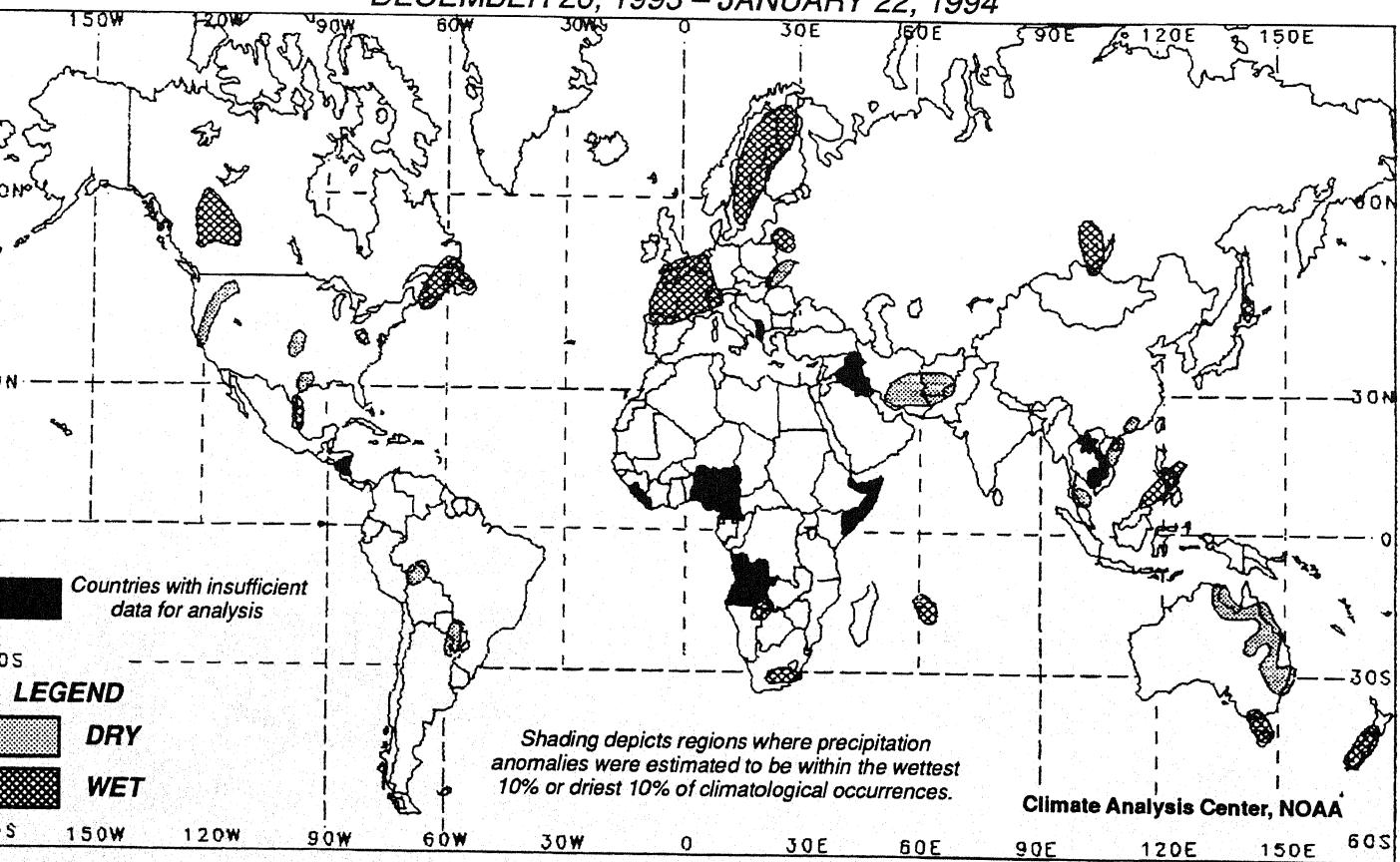
TWO-WEEK GLOBAL TEMPERATURE ANOMALIES

JANUARY 9 - 22, 1994



FOUR-WEEK GLOBAL PRECIPITATION ANOMALIES

DECEMBER 26, 1993 - JANUARY 22, 1994



ANNUAL CLIMATE SUMMARY

MAJOR CLIMATIC EVENTS AND ANOMALIES IN THE UNITED STATES DURING 1993

1. Central States:

SEVERE FLOODING RAVAGES MIDDLE OF THE COUNTRY.

The Great Flood of 1993 was the dominant climate event of the year. Recurrent thunderstorm complexes traversed the region, sustained by a quasi-stationary circulation consisting of an intense low-level flow of moist Gulf air to the east of an unseasonably strong upper-level trough over the Rockies. The combination of the persistent trough and a strong jet stream propagated a large number of cyclonic storms, fueled by an ample supply of moisture. These downpours fell on areas already saturated by well-above normal July 1992 – March 1993 precipitation, resulting in the widespread catastrophic Summer floods. In April, the Cedar and Iowa Rivers in Iowa reached record levels, engendering severe localized flooding. By the middle of May, rising river levels forced the halting of navigation on the Missouri River between Kansas City and Boonville, MO. The month ended with extensive flooding across southeastern South Dakota and northwestern Iowa. Heavy and widespread rains fell over much of the region from early June through most of July, with more localized cloudbursts occurring in August and September. Between 30 and 38 inches of rain fell on much of Iowa and parts of Kansas, Missouri, and Minnesota during the Summer, and several locations received almost a year's worth of normal rainfall during April – July. New record high river levels were reported across much of the Mississippi/Missouri Rivers complex north of the Ohio River confluence during Summer, with the river stage at St. Louis remaining above flood stage for 80 days. More than 75% of levees across the region were breached or overtopped, and barge traffic was halted along the lower 535 miles of the Missouri River and along 585 miles of the Mississippi River north of Cairo, IL. Nearly 16,000,000 mi² of land was covered by water at some point during the flooding, and several water treatment facilities were contaminated or rendered inoperable by flood waters. Hundreds of thousands of individuals were left without potable tap water for a few days to a couple of weeks, especially in the Des Moines, IA, St. Joseph, MO, and Alton, IL areas. For several days in late July, no Mississippi River bridge crossings were open between Burlington, IA and St. Louis, MO (a span of 212 miles). By the time most rivers finally receded in early September, damage estimates topped \$11 billion. During the last half of September, an additional 12 to 18 inches of rain fell on parts of Kansas, southern Missouri, and northern Arkansas, with lesser amounts reported northward through Iowa, resulting in additional localized flooding. Short-term moisture conditions finally improved in October.

2. The South and East:

DROUGHT CONDITIONS PREVAIL.

While flooding ravaged the central states, the same persistent circulation pattern steered storm systems away from southern and eastern sections of the nation. As a result, abnormally hot and dry weather covered much of the Southeast and Atlantic Seaboard. Moisture shortages were first observed across southern and eastern Georgia and much of South Carolina in April. Subnormal precipitation was reported from northeastern Texas eastward to the South Atlantic Coast in May and June, except for Tropical Storm Arlene's brief but intense rainfall in mid-June. Scattered showers brought limited relief during late June and early July, but an intense heat wave aggravated the unusually dry conditions across the Southeast and mid-Atlantic during mid-July. Apparent temperatures (a heat index) soared to above 115°F as far north as Newark, NJ. Although the excessive heat quickly ended, the typical summer thunderstorms did not ensue as Dallas–Fort Worth, TX endured the first precipitation-free month (July) in 90 years. Temperatures averaged 2–5°F above normal across the southeastern quarter of the country through June and July, with Augusta, GA reaching at least 95°F on 47 of the 61 days during the period. Dry weather persisted well into August, despite scattered heavy thunderstorms early in the month. San Antonio, TX finally ended its record run of consecutive days without measurable precipitation at 63 when 0.01 inch was observed on August 30. Hurricane Emily brushed the Outer Banks of North

Carolina as September approached, dropping over seven inches of rain on Cape Hatteras, but recurring northeastward before providing widespread moisture to the Southeast. Variable precipitation persisted well into October before abundant rains and early-season snows provided relief from the long-term dryness. According to the U. S. Department of Agriculture, corn and soybean yields dropped 17% and 33%, respectively, from last year's record harvest as a result of the Midwestern floods and Southeastern drought.

3. The East:

MASSIVE WINTER STORM OVERPOWERS THE EAST.

In mid-March, the "Storm of the Century" brought significant snows as far south as southern Alabama and northern Florida while one to four feet of snow buried the northeastern quarter of the country from Tennessee and North Carolina northeastward across the eastern Ohio Valley, northern mid-Atlantic, and New England. Wind gusts approaching hurricane force combined with the heavy snow to produce widespread blizzard conditions, down trees and power lines, and cause structural damage. To the south of the wintry conditions, a line of severe thunderstorms generated a storm surge of 9–12 feet along the Gulf Coast of Florida near Apalachicola, wind gusts exceeding 100 mph, and a deadly tornado outbreak. The storm claimed more than 240 lives, caused an estimated \$1 billion in damages, and may have generated several billion dollars in snow removal expenses. In addition, central pressures dropped to an estimated 960 mb in central Delaware, and several all-time low-pressure records were broken during the storm's trek up the Atlantic Coast, some of which dated back to Hurricane Hazel (October 1954).

4. The Far West:

WESTERN DROUGHT ENDS.

The long-term drought in the Far West was broken when copious Winter (1992–'93) precipitation, exceeding 600% of normal in parts of Arizona and southern California, significantly increased the region's snowpack and raised river and reservoir levels. This marked the second successive wet season with well above normal precipitation in southern sections, and the first since the 1985–'86 season with above normal precipitation in all ten of California's hydrologic regions. Unfortunately, drought relief in California, Nevada, and Arizona was accompanied by flash floods and mudslides, particularly in January. Serious flooding in Arizona and southern California claimed several lives and caused considerable property and crop damage, with flow through Arizona's Gila River at the head of Safford Valley at 840,000 acre-feet compared to a normal January flow of 16,800 acre-feet. A brief respite followed at the end of January, then wet weather resumed in February. One feature of the 1992–'93 wet season was the relative "coldness" of the storms that affected the region, allowing a greater than normal proportion of each storm's precipitation to fall as snow, especially in the higher elevations of California and Oregon. Deep mountain snowpack is critical in the region, since spring and summer snowmelt provides much of the region's usable water. Reservoir storages in California reached the highest level since 1987, and precipitation in water-critical areas, the total water-year runoff, and snow water content were at or above the levels measured during the "flood" season of 1985–'86.

5. Southern California:

SANTA ANA WINDS ENGENDER WILDFIRES.

During late October and early November, the gradient between high pressure centered over Utah and a low in northwestern Mexico provided strong Santa Ana (easterly) winds across southern California. These gusty winds, blowing off the Southwestern deserts, created very low relative humidities and high temperatures, generating an extremely hazardous fire situation. In addition, last winter's (1992–'93) ample precipitation resulted in the abundant growth of grasses, which combined with dead brush and timber from the previous

long-term drought (1986-'92) to provide ample fuel for the rapid spread of fires. Whipped by the strong Santa Ana winds, dozens of wildfires consumed over 200,000 acres and more than 1,000 homes, took 4 lives, injured hundreds of individuals, displaced thousands of people, and caused an estimated \$1 billion in damage, according to press reports.

6. The Northwest:

AN UNUSUALLY COOL SUMMER.

Unseasonably cool air enveloped much of the region during Summer in conjunction with the persistent upper-level trough over the Rockies. Temperatures averaged 4°F to 7°F below normal, with four states (Idaho, Montana, Oregon, and Utah) experiencing the coolest Summer on record (since 1895). In mid-May, well-below normal temperatures blanketed the northwestern Plains, and covered the entire region during June and early July. By the end of the month, the largest negative departures shifted eastward, but temperatures remained below normal until mid-August.

7. Western and North-Central States:

VERY MILD JANUARY.

At the end of January, three weeks of very mild weather followed bitterly cold conditions that had covered the region from mid-December to mid-January. Weekly temperatures averaged as much as 22°F above normal, and highs climbed into the sixties along the western slopes of the Rockies.

8. The Northwest:

WET SEASON ENDS LATE.

The first half of March featured relatively light precipitation, but by mid-month moderate precipitation combined with declining normals (as the typically drier summer season approached) to eliminate short-term moisture shortages. Moderate to heavy precipitation during the ensuing six weeks engendered large moisture surpluses, with April totals of 5 to 15 inches reported from northern California northward through the western halves of Oregon and Washington. Wet conditions continued during the first half of May, but drier weather prevailed in late May and early June. Unseasonably heavy rains between two to six inches soaked the area during mid-June, and an additional one to five inches fell in mid-July before the normally dry summer weather ensued. With moderate rains reported during a time of year when precipitation is typically negligible, four states (Idaho, Montana, Oregon, and Utah) experienced the wettest summer in 99 years of record, and three others (Nevada, Washington, and Wyoming) endured one of the three wettest since 1895.

9. Central and Eastern States:

COLD CONDITIONS COVER MOST OF THE COUNTRY.

Temperatures averaged 5°F to 10°F below normal across the northwestern quarter of the country during January, and Arctic air plunged into all but the southwestern corner of the nation in mid-February. Subzero lows reached southward into the central Great Basin, southern Kansas and Missouri, and northern West Virginia during the last half of the month. Milder, but still colder than normal air covered much of the country during the first half of March, and by mid-month, resultant ice-jam flooding along a few rivers closed several highways in Nebraska. Bitterly cold air swept into the east in the wake of the "Blizzard of '96" in mid-March, with dozens of new daily and a few records established. The mercury plummeted to 5°F dipped below freezing as far south as Daytona, and moderate conditions developed.

SON STARTS SLOWLY.

Reases across the region from late August through mid-winter. Following an abnormally

wet summer, totals from late August through early October 1993, however, lagged well behind typical seasonal values, with only scattered weekly amounts ranging from a few tenths to as much as an inch reported. In mid-October, moderate rains fell on parts of northern California, western Oregon, and western Washington, but very dry conditions again dominated the region from late October through November. The sudden onset of abundant precipitation finally ended the dry spell in early December.

11. Southern States:

TROPICAL SYSTEMS BRING HEAVY RAINS.

The first organized tropical system of 1993 drenched southern Florida with up to ten inches of rain in late May, just hours before the official start of the northern Atlantic hurricane season (June – November). The storm succumbed to strong level upper-level wind shear as it moved through the Bahamas and out to sea. Three weeks later, the first named tropical storm of the season, Arlene, made landfall over southern Texas. Although only a minimal storm with sustained winds of approximately 40 mph, Arlene and her remnants dropped intense rainfall and inundated much of southern and eastern Texas and southern Louisiana. June rainfall totals of six to eighteen inches, much of which fell in association with Arlene or her remnants, were reported throughout southern and eastern Texas, Louisiana, and southern Mississippi.

12. Hawaii:

UNUSUALLY DRY WEATHER OBSERVED.

Very dry conditions developed on the island chain near the start of the year and persisted through much of April. During January 1 through April 10, only 10% to 50% of normal rains fell, with the larger values reported on the islands of Hawaii and Maui. Only one to two inches dampened Lihue and Honolulu, compared to normals of approximately 14 and 8 inches, respectively. Abundant rains fell on the Big Island during May, but moisture shortages persisted on the remaining islands until the normally dry time of year began in June.

13. Central and Eastern States:

WINTRY WEATHER PLAGUES REGION.

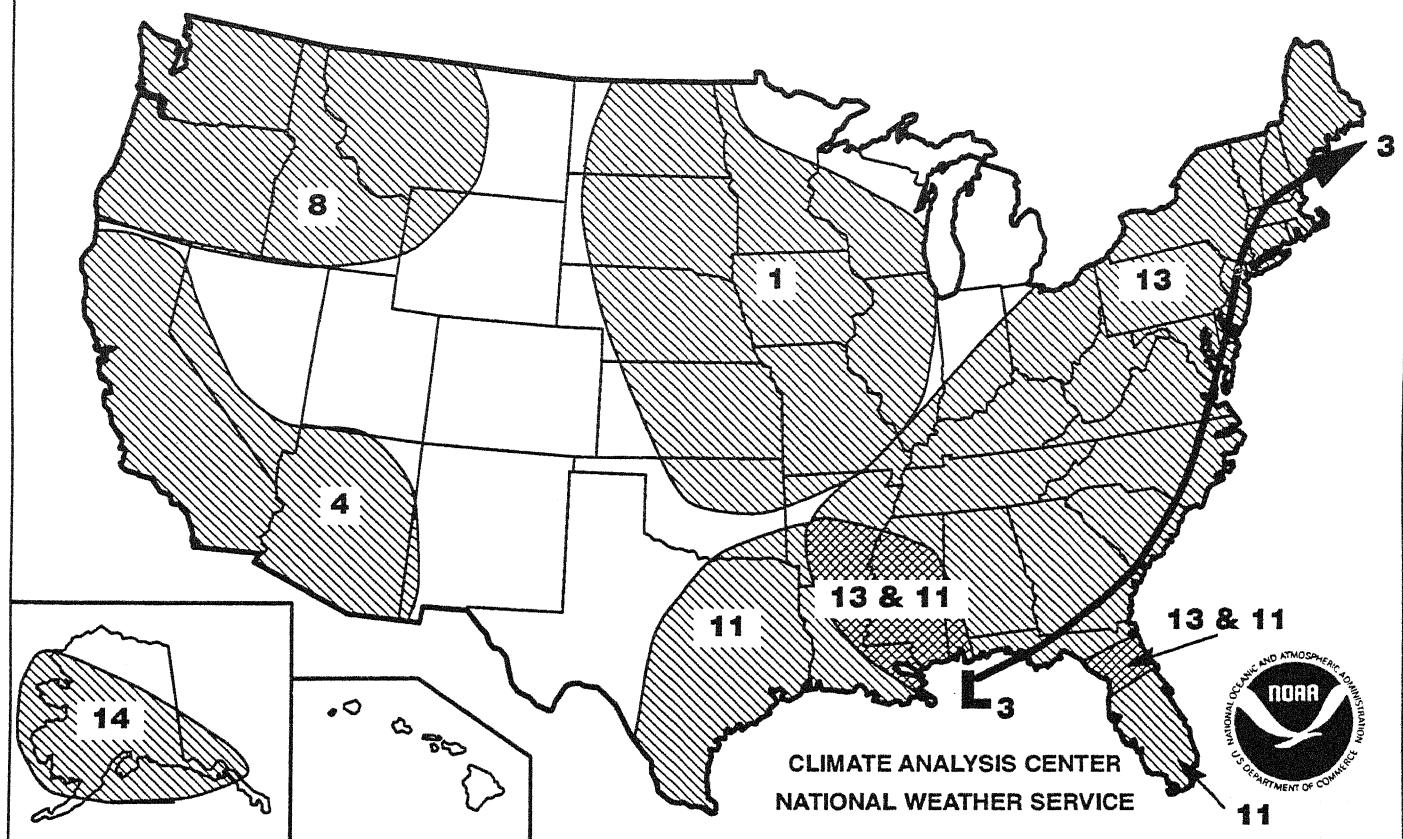
A series of strong cold fronts pushed abnormally cold air into the central states during late October and early November, with subfreezing temperatures penetrating as far south as the Gulf of Mexico. Lows in the teens occurred in southeastern New Mexico and southern Oklahoma while single-digit readings were widespread across the High Plains from the Canadian border southward to the Texas Panhandle. San Antonio, TX reported its first snow ever in October when a trace fell on the 30th while Atlanta received its first October snow since 1926. In mid-November, heavy precipitation drenched parts of Missouri, Illinois, and Indiana, forcing rivers and streams out of their banks. Late November was punctuated by a powerful, slow-moving storm which tracked across the eastern two-thirds of the United States. As much as two feet of snow buried the Dakotas, and freezing or frozen precipitation fell throughout the Plains as far south as central Texas, snarling Thanksgiving holiday travel across a large part of the country. To the east, three to eight inches of rain in a 24-hour period deluged the mid-Atlantic from the Carolinas to New England, causing localized river, stream, and urban street flooding.

14. Alaska:

MILD AND WET CONDITIONS PREVAIL.

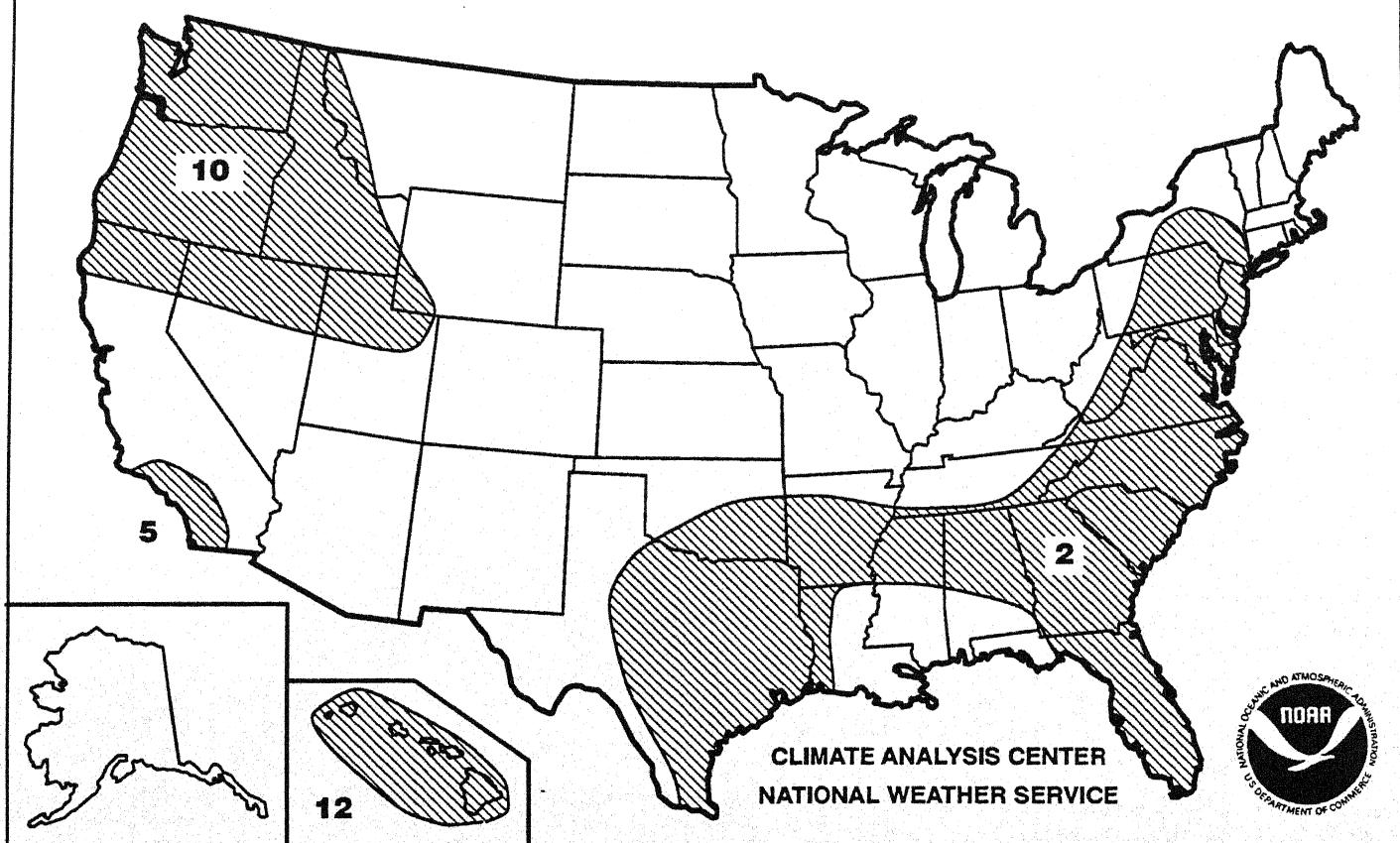
Heavy precipitation inundated much of Alaska in September and October, with over twice the normal totals reported across the southwestern quarter of the state. Drier weather ensued in early November as temperatures averaged 15°F to 25°F above normal in the middle of the month. Additional heavy precipitation fell in early December, but drier conditions prevailed by mid-month.

1993 ABOVE-NORMAL PRECIPITATION ANOMALIES

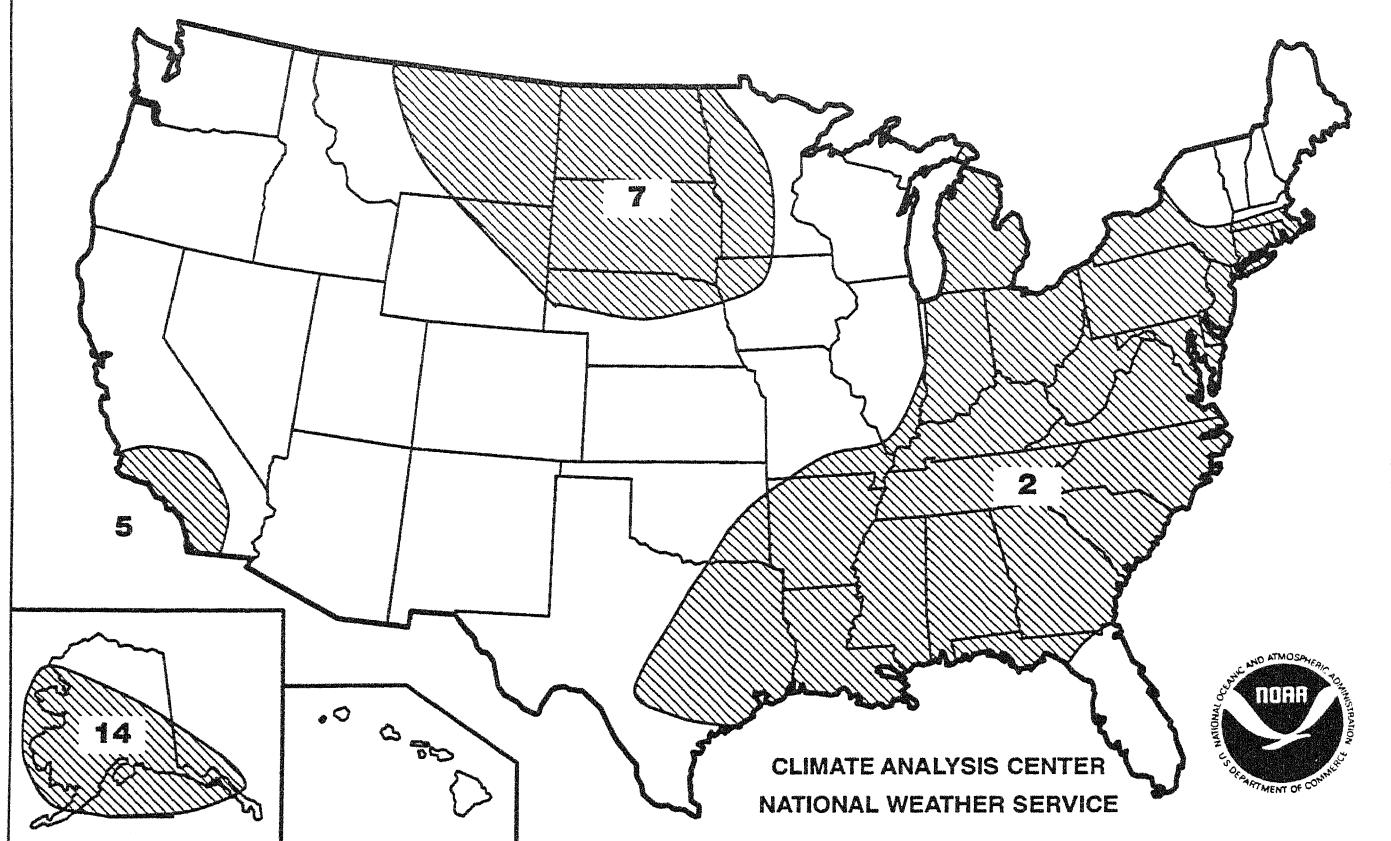


These maps depict the areas affected by the anomalies described on pp. 7 and 8.

1993 BELOW-NORMAL PRECIPITATION ANOMALIES

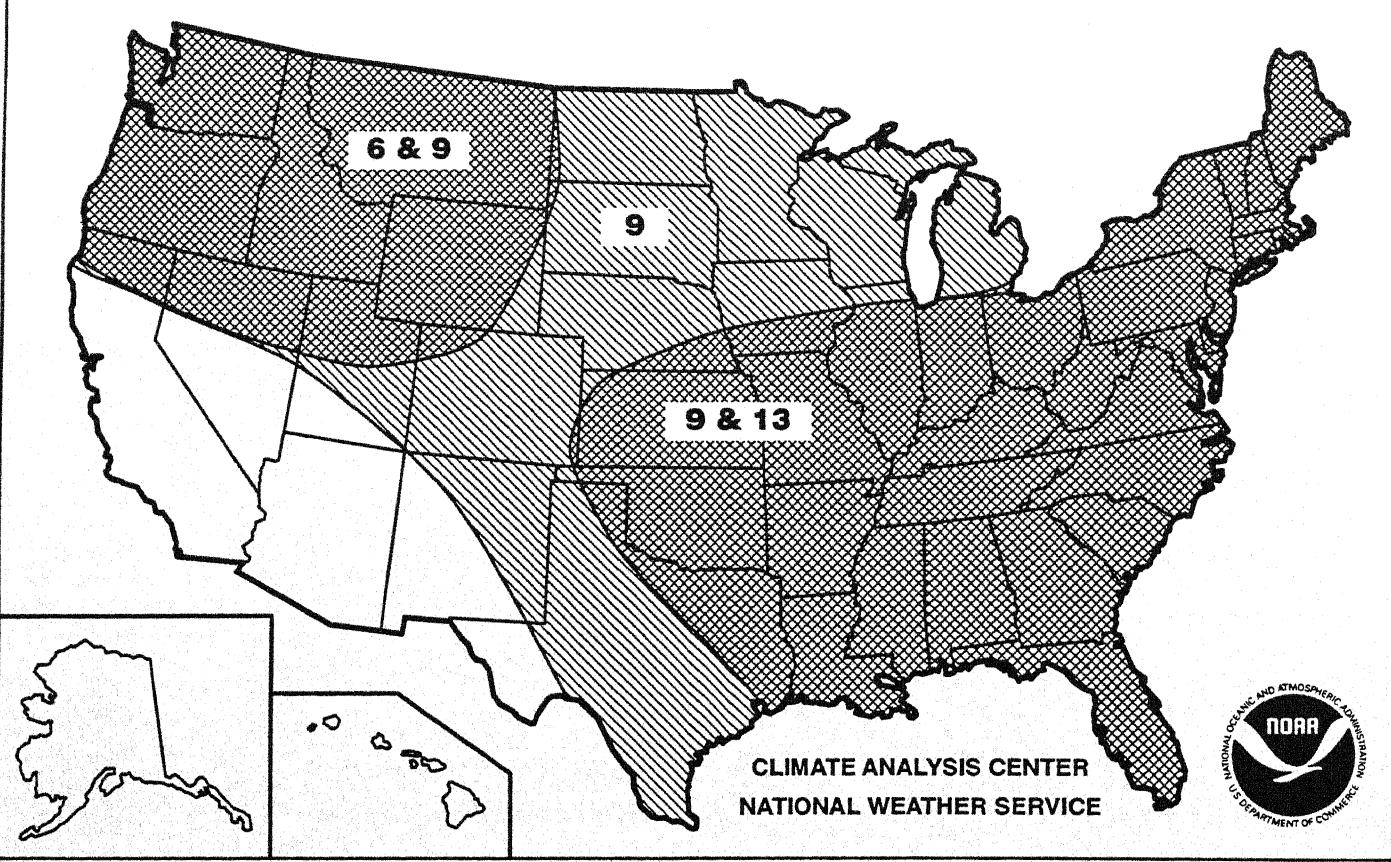


1993 ABOVE-NORMAL TEMPERATURE ANOMALIES



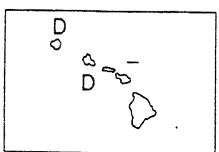
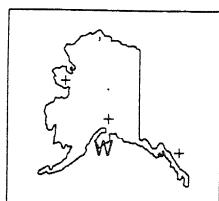
These maps depict the areas affected by the anomalies described on pp. 7 and 8.

1993 BELOW-NORMAL TEMPERATURE ANOMALIES

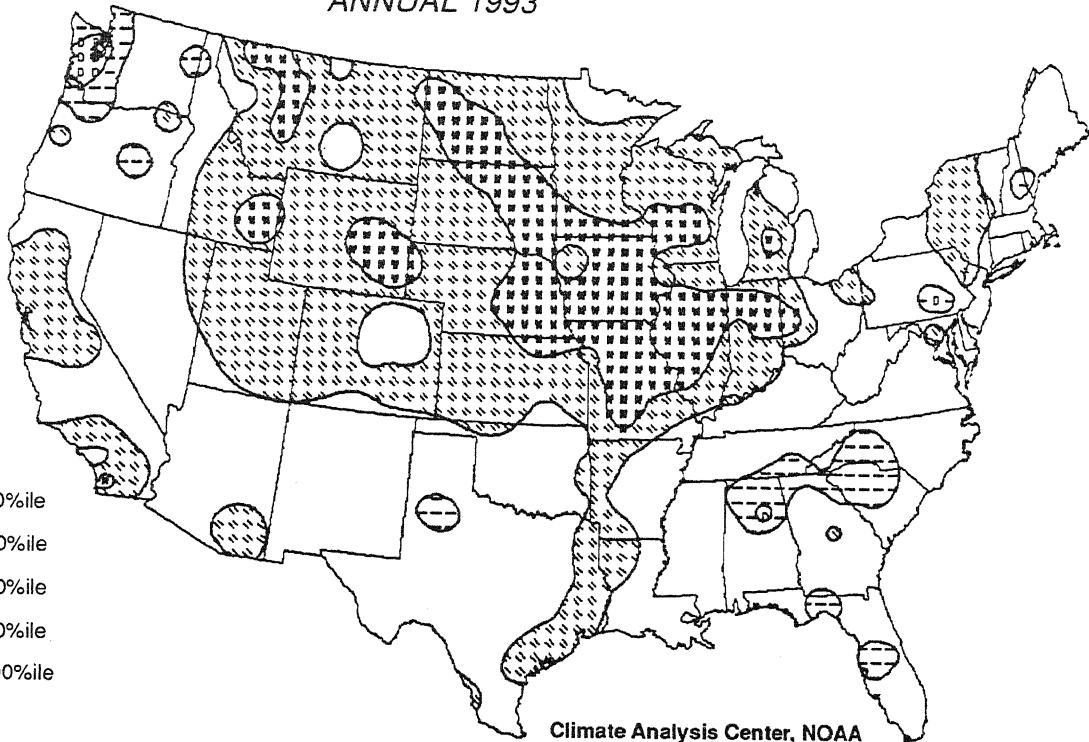


PRECIPITATION PERCENTILES

ANNUAL 1993



- D less than 10%ile
- 10%ile to 30%ile
- . 30%ile to 70%ile
- + 70%ile to 90%ile
- W more than 90%ile

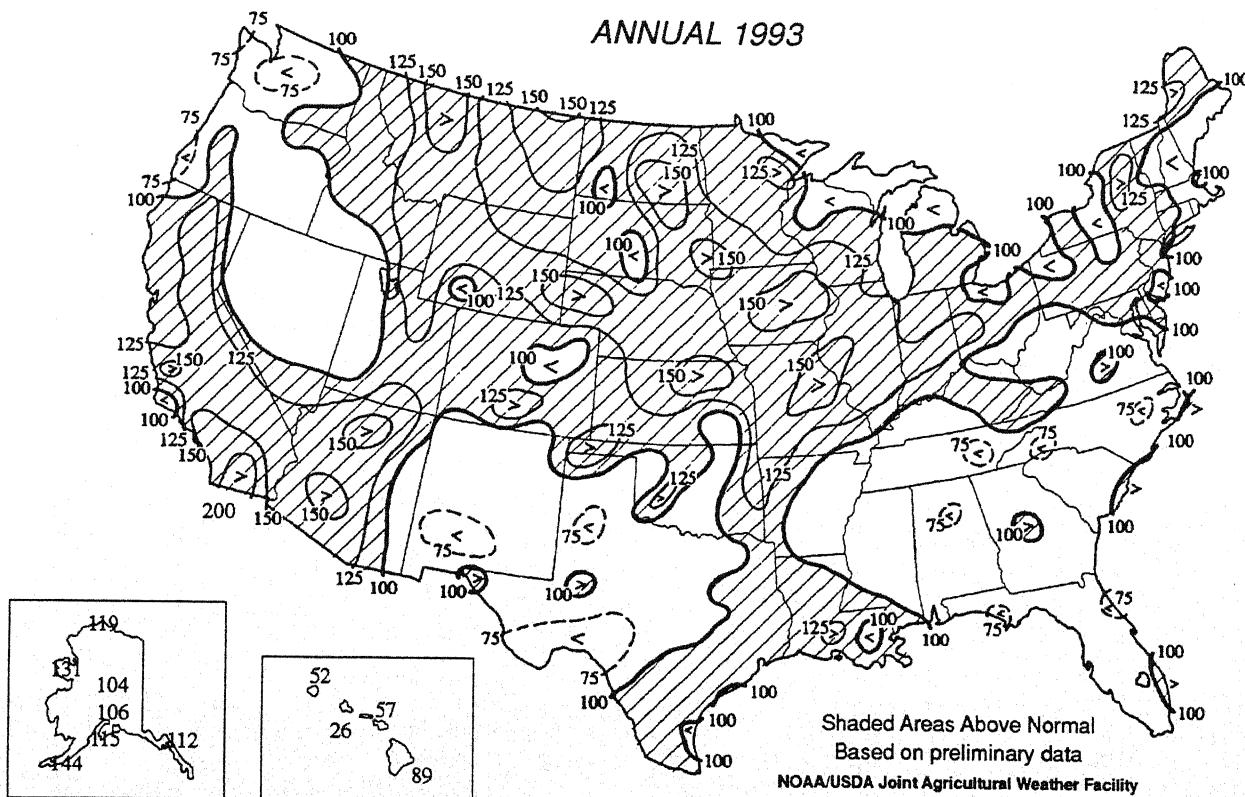


Climate Analysis Center, NOAA

ANNUAL 1993 PRECIPITATION PERCENTILES, as computed by the Climate Analysis Center. An unusually wet year (>70%ile) was observed in portions of the Southwest and across much of the nation from the Rockies eastward through the Ohio Valley, with annual totals among the highest 10% of the historical (1961 – 1990) distribution in parts of the northern Plains, the Corn Belt, and the Midwest. Climatologically significant dryness (<30%ile) was limited to the southern Appalachians and the Pacific Northwest, where totals were among the lowest 10% of the historical distribution in western Washington.

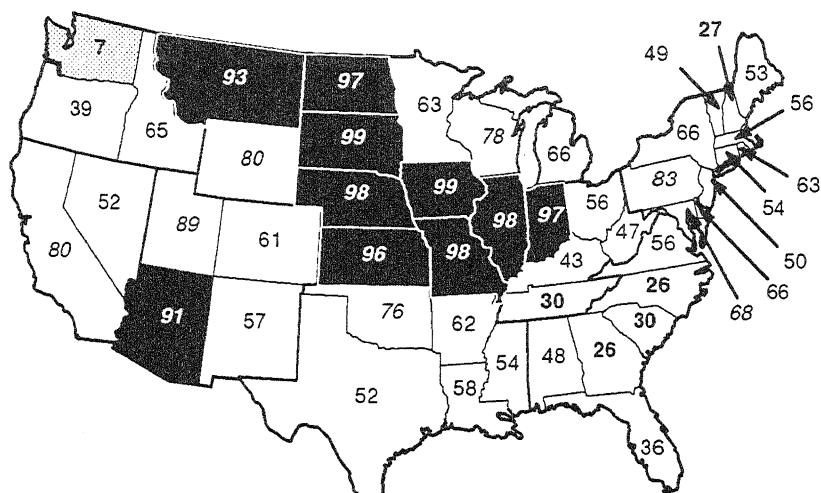
PERCENT OF NORMAL PRECIPITATION

ANNUAL 1993



ANNUAL 1993 PERCENT OF NORMAL PRECIPITATION. Shaded areas received above normal precipitation. Above normal precipitation fell on much of the Southwest, the northern tier of states from the Rockies eastward to New England, and throughout much of the central Plains and western Gulf Coast. In contrast, abnormally dry weather prevailed across the Pacific Northwest, southern portions of the Rockies and High Plains, and most of the Southeast.

HISTORICAL PRECIPITATION RANKINGS BY STATE ANNUAL 1993



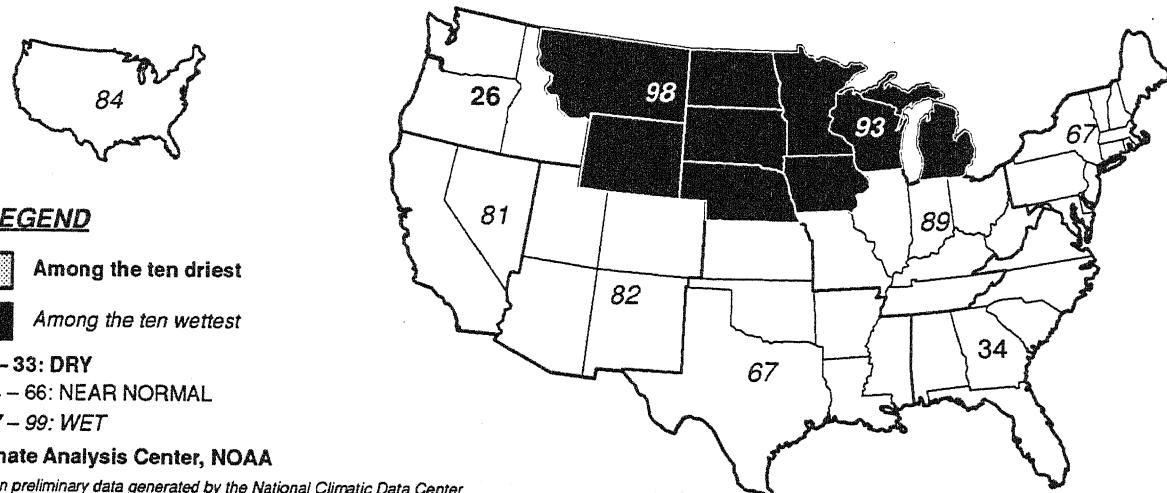
LEGEND

- Light gray: Among the ten driest
- Dark gray: Among the ten wettest
- 1 – 33: DRY
- 34 – 66: NEAR NORMAL
- 67 – 99: WET

Climate Analysis Center, NOAA

This chart depicts the ranking of the specific parameter, as measured during the period indicated, with respect to all other such periods on record since 1895.

HISTORICAL PRECIPITATION RANKINGS BY REGION AND NATION ANNUAL 1993

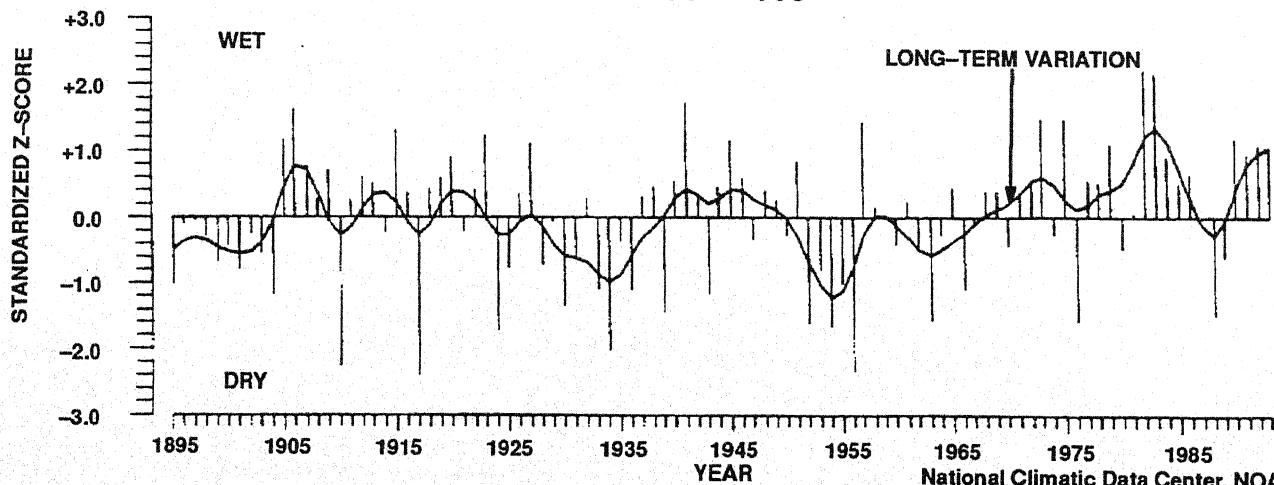


Climate Analysis Center, NOAA

Based on preliminary data generated by the National Climatic Data Center

This chart depicts the ranking of the specific parameter, as measured during the period indicated, with respect to all other such periods on record since 1895.

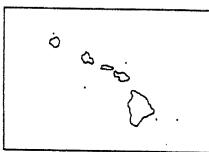
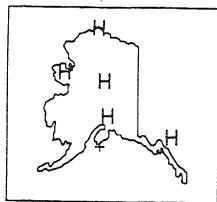
U. S. NATIONAL NORMALIZED PRECIPITATION INDEX ANNUAL 1895 – 1993



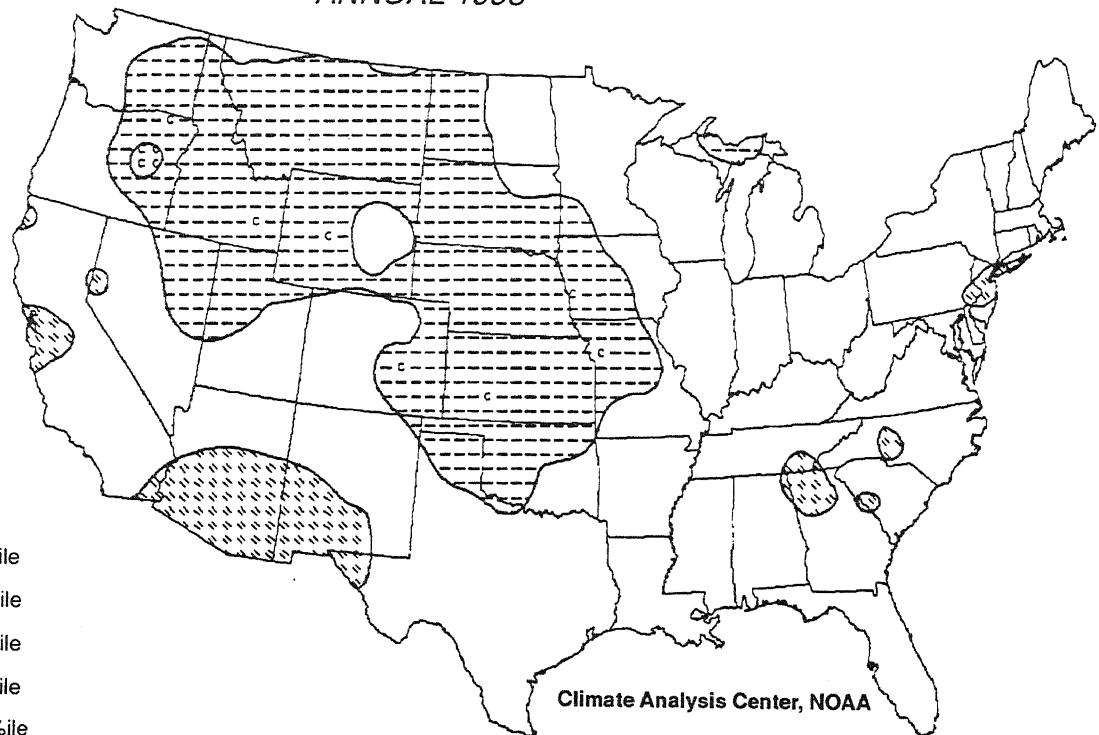
NATIONAL MEAN ANNUAL 1895–1993 PRECIPITATION INDEX, as computed by the National Climatic Data Center. 1994 was the 16th wettest year on record as heavy precipitation in the central states dominated the index. This is the fourth consecutive year with above-median precipitation nationally. This index takes local normals into account so that regions with large precipitation amounts do not dominate the index value.

TEMPERATURE PERCENTILES

ANNUAL 1993



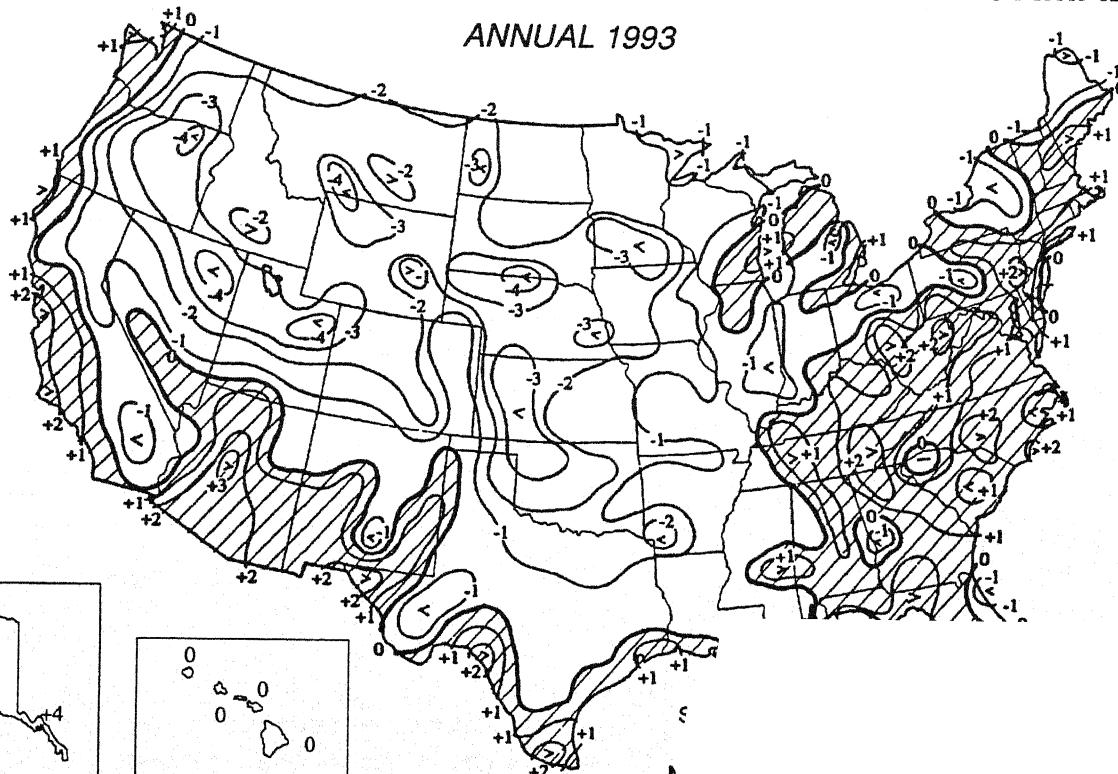
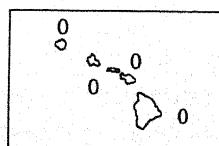
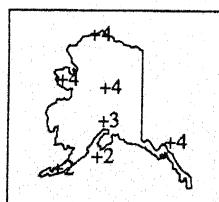
- C less than 10%ile
- 10%ile to 30%ile
- . 30%ile to 70%ile
- + 70%ile to 90%ile
- H more than 90%ile



ANNUAL 1993 TEMPERATURE PERCENTILES, as computed by the Climate Analysis Center. *Unusually cold weather (<30%ile) prevailed across the northern Rockies, the northern High Plains, and the central Plains. Abnormally warm conditions were limited to portions of the Southwest and the Southeast.*

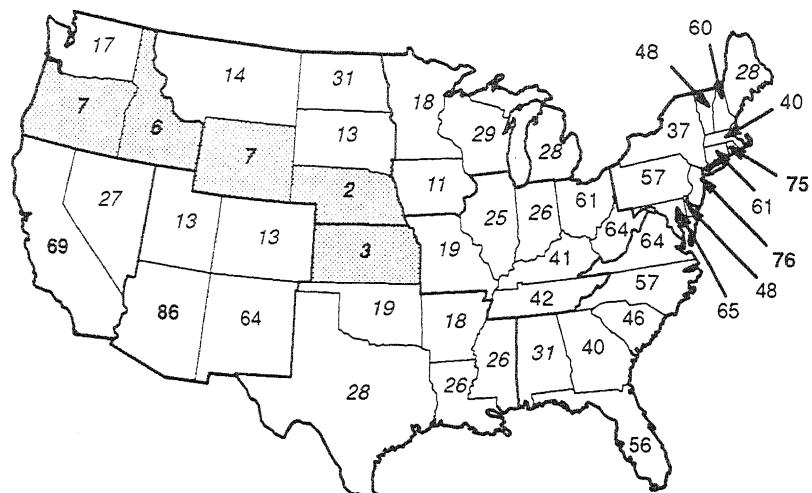
DEPARTURE OF AVERAGE TEMPERATURE FROM NORMAL (°F)

ANNUAL 1993



ANNUAL 1993 DEPARTURE OF AVERAGE TEMPERATURE FROM NORMAL (°F). Shaded areas experienced above normal temperatures. Cooler than normal conditions dominated most of the country from the Sierras and the Cascades eastward to the Great Lakes and Ohio Valley, with departures below -4°C at scattered locations in the Great Basin, Rockies, and High Plains. In sharp contrast, above normal temperatures prevailed along the Pacific Coast, across much of the desert Southwest, and throughout most of the East from the Ohio Valley eastward to the Atlantic Seaboard and southward to the Gulf of Mexico.

HISTORICAL TEMPERATURE RANKINGS BY STATE ANNUAL 1993



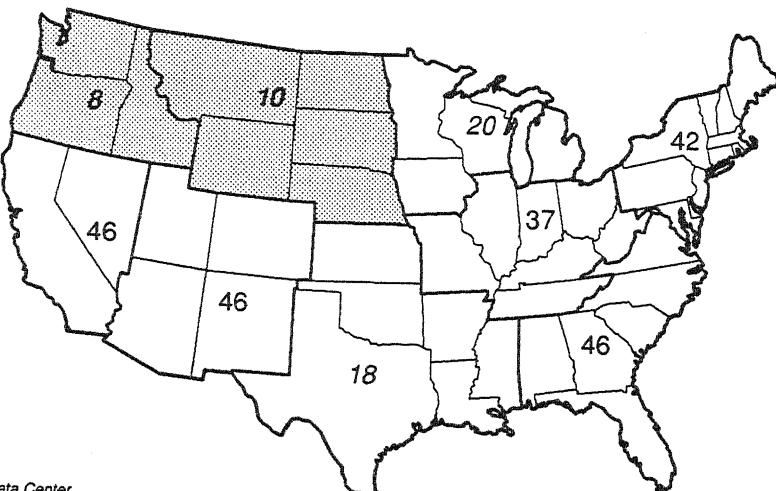
LEGEND

- Among the ten coldest
 - Among the ten warmest
- 1 – 33: COLD
34 – 66: NEAR NORMAL
67 – 99: WARM

Climate Analysis Center, NOAA

Based on preliminary data generated by the National Climatic Data Center with respect to all other such periods on record since 1895.

HISTORICAL TEMPERATURE RANKINGS BY REGION AND NATION ANNUAL 1993



LEGEND

- Among the ten coldest
- Among the ten warmest

1 – 33: COLD

34 – 66: NEAR NORMAL

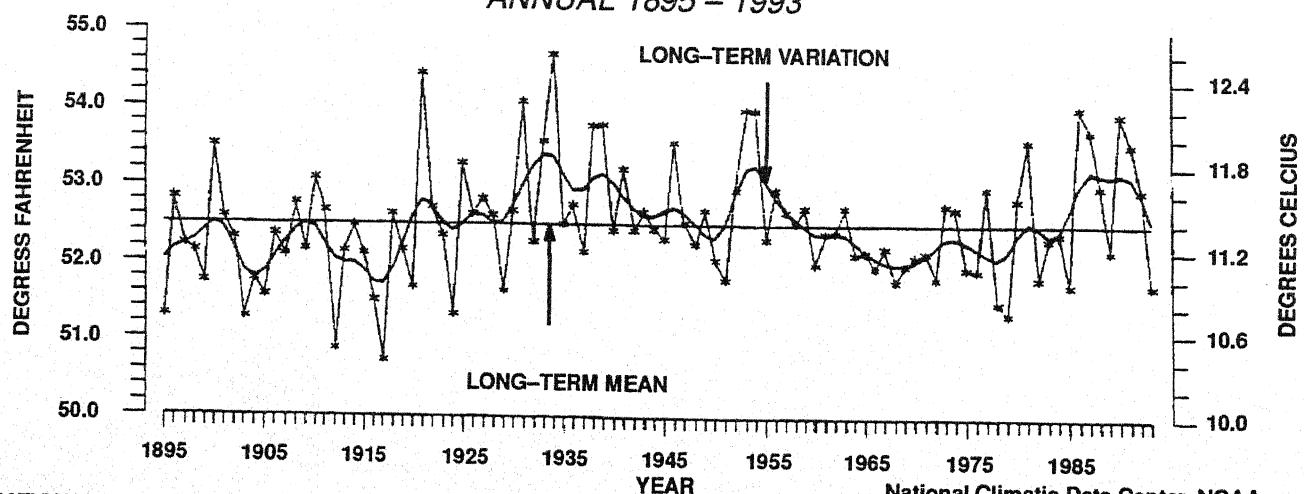
67 – 99: WARM

Climate Analysis Center, NOAA

Based on preliminary data generated by the National Climatic Data Center

This chart depicts the ranking of the specific parameter, as measured during the period indicated, with respect to all other such periods on record since 1895.

U. S. NATIONAL TEMPERATURE ANNUAL 1895 – 1993



National Climatic Data Center, NOAA

NATIONALLY AVERAGED ANNUAL 1895–1993 TEMPERATURES, as computed by the National Climatic Data Center. 1993 was the 13th coldest year on record, with the index dominated by extensive areas of submedian temperatures across the central and northwestern states. This marks the first year since 1989 that nationally averaged annual temperatures were below the median value.

